United States Patent [19]

Kovalevich

[11] **4,398,334**

[45] **Aug. 16, 1983**

[54] **DUCT WORK CLIP INSTALLER AND CRIMPER**

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[21] Appl. No.: **297,690**

[22] Filed: **Aug. 31, 1981**

[51] **Int. Cl.**[3] **B23P 11/00**

[52] **U.S. Cl.** **29/243.5;** 29/243.56; 29/283.5; 72/211

[58] **Field of Search** 29/243.5, 243.56, 243.57, 29/243.58, 283.5; 72/210, 211

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[57] **ABSTRACT**

A hand tool for installing clips to abutting edges of ducts and for crimping the clips to secure the ducts together is comprised of a rectangularly shaped base plate including pairs of opposed rollers mounted thereon with their axes perpendicular to the plate. A gap between the rollers is approximately the same size as the width of the combined edges being secured together. A raised pusher member pushes a clip which is resting on the plate into place and the same is crimped by the rollers when the tool is drawn back. A handle is located on the reverse side of the plate for manually moving the tool.

9 Claims, 6 Drawing Figures

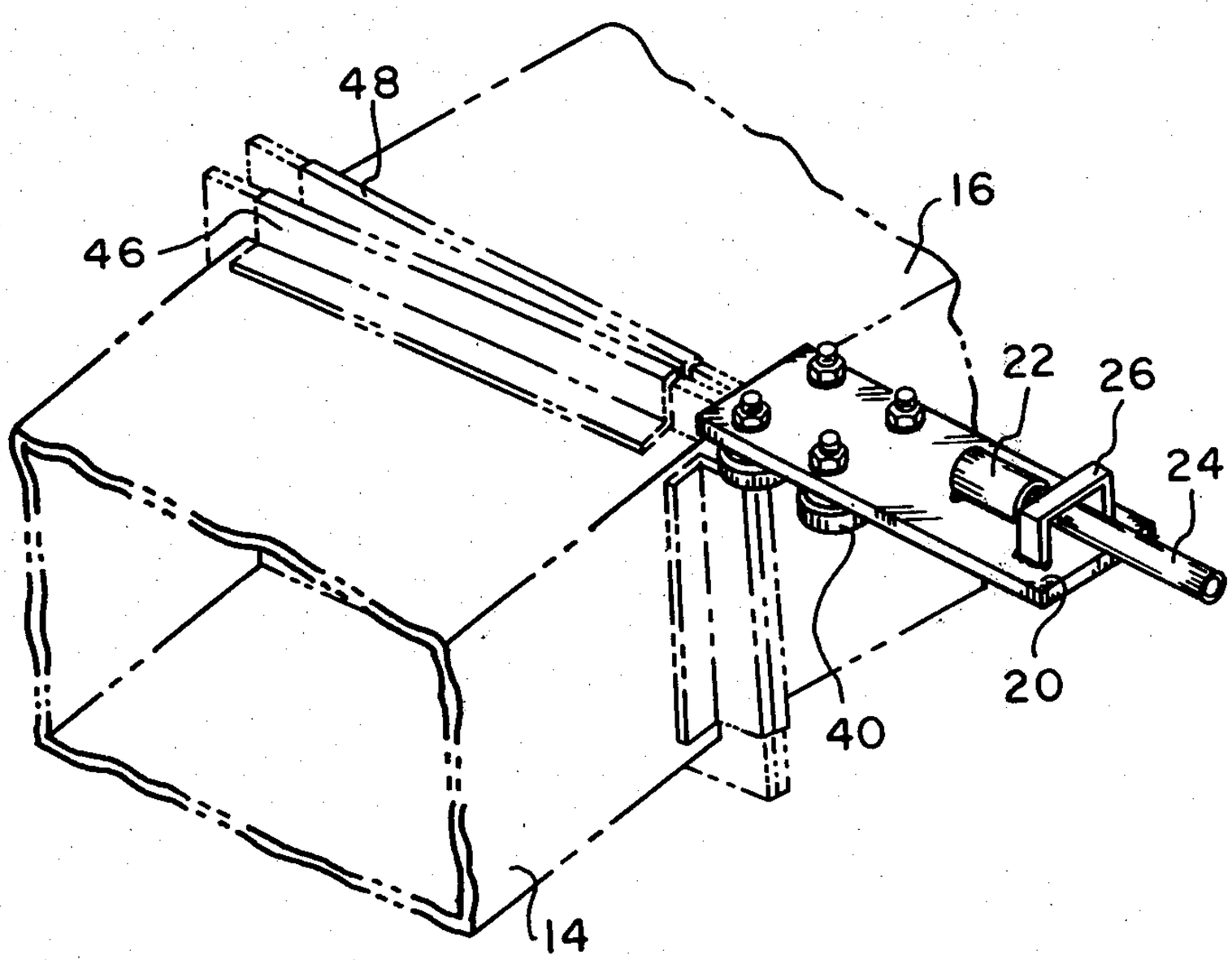


Fig. 1

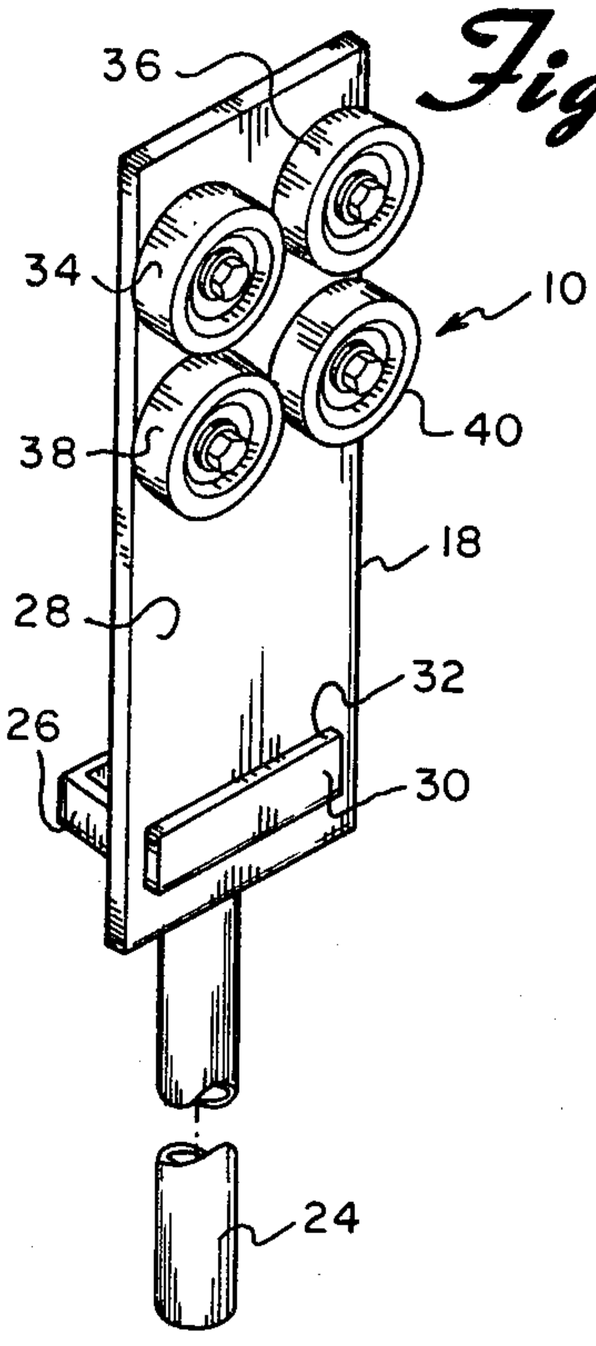


Fig. 2

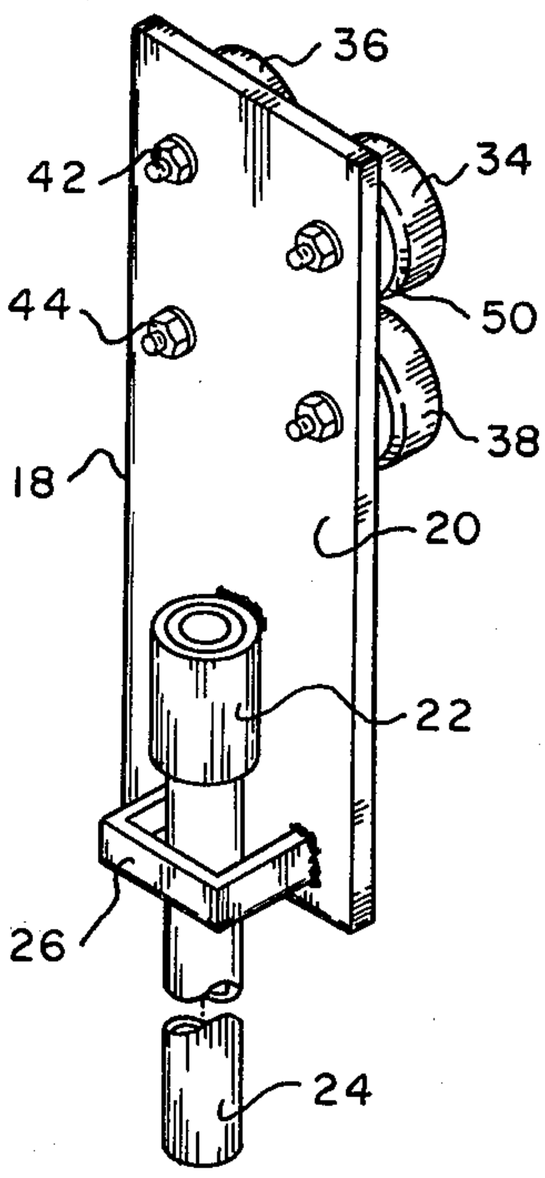


Fig. 3

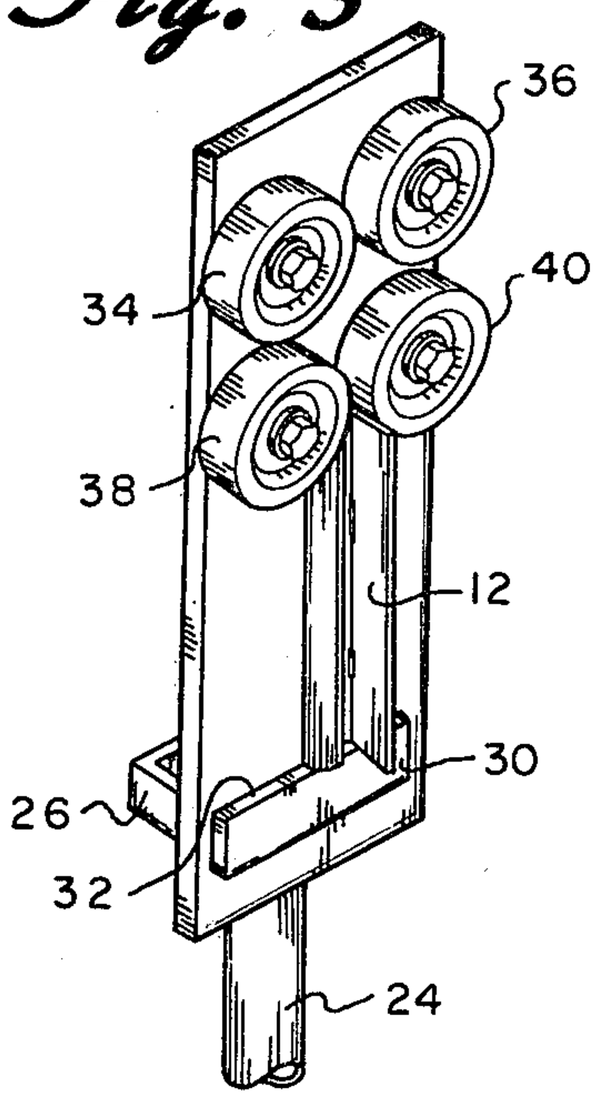


Fig. 4

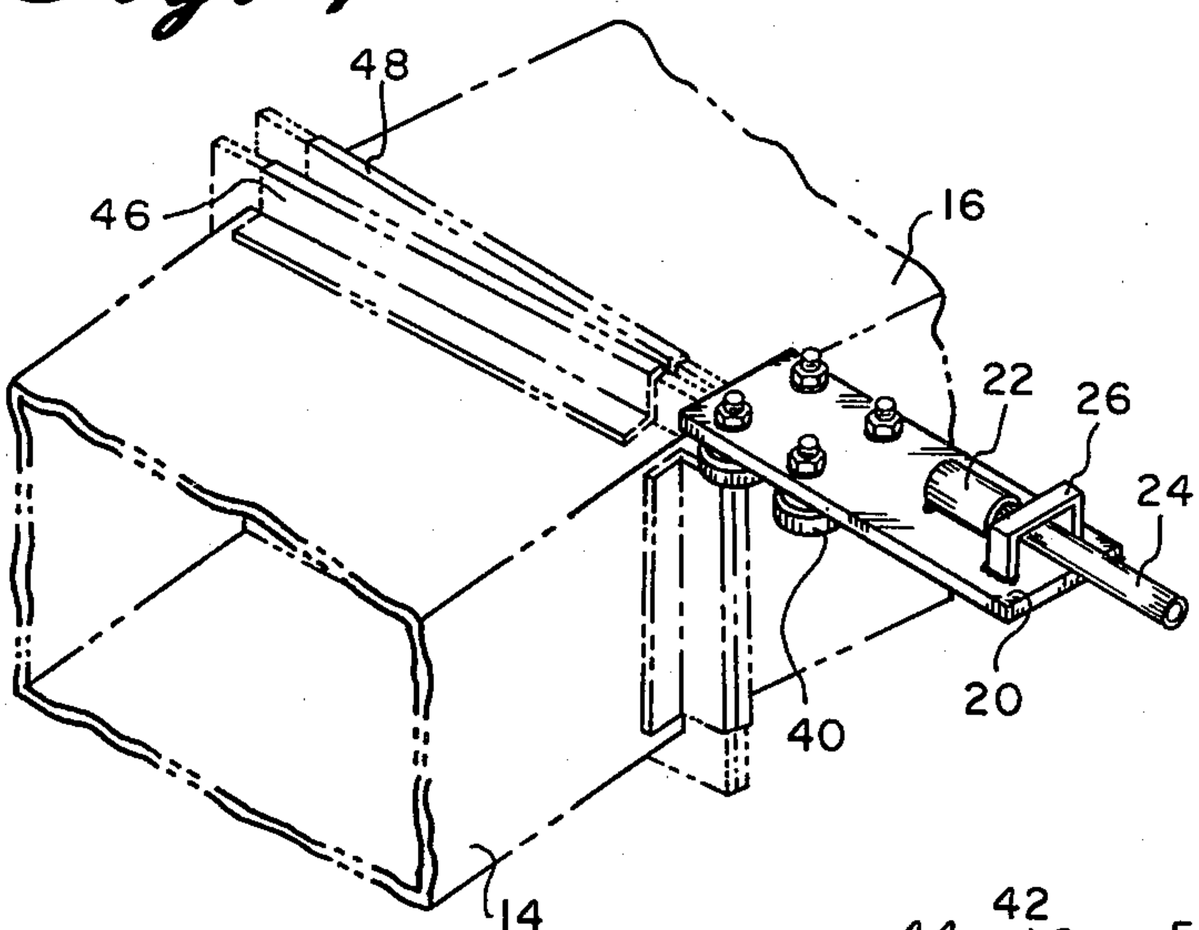


Fig. 5

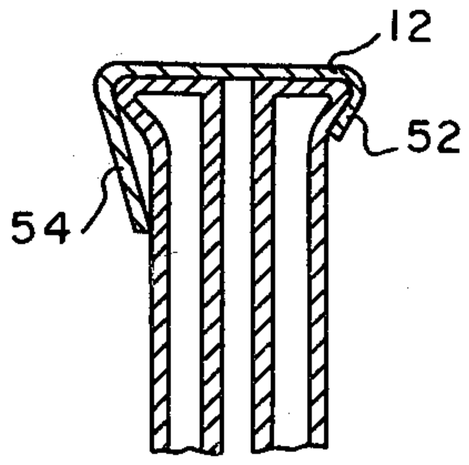
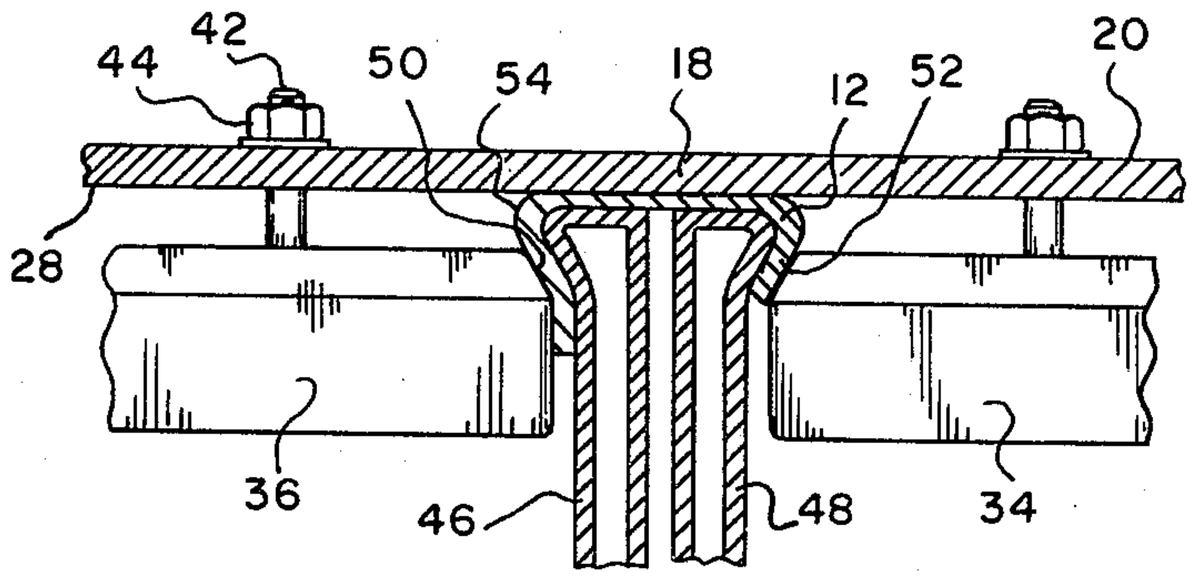


Fig. 6



DUCT WORK CLIP INSTALLER AND CRIMPER

BACKGROUND OF THE INVENTION

The present invention is directed toward a hand tool and more particularly toward a hand tool for installing clips to abutting edges of ducts and for crimping the clips to secure the ducts together.

As is well known in the art, duct work is utilized in many different types of installations for air conditioning, ventilation systems and the like. A common type of duct system utilized today is comprised of sections of rectangularly shaped tubular members having flanges extending totally around the peripheral edges thereof. Sections of the duct work are joined together by mating the flanges and by then bolting the flanges together and/or by applying clips on the flanges to maintain the same together.

The clips which are presently used to fasten the flanges together are elongated channel-shaped sheet metal members having a length of approximately five inches. They are conventionally installed by manually placing them over the adjoining edges of the duct work around the flanges and then hammering them into place. The clips are then further hammered in order to crimp the sides of the clips around the flanges.

The conventional method of installing the clips has not proven to be satisfactory. It has been found that the clips cannot be uniformly and adequately crimped using this prior art method. Furthermore, there are certain installations which due to space limitations make it impossible to reach the clips with a hammer, thereby making it impossible to crimp the same.

SUMMARY OF THE INVENTION

The present invention overcomes the problems of the prior art methods described above and provides the only means known to Applicant for installing and crimping such clips. The present invention is specifically directed toward a hand tool for installing clips to abutting edges of ducts and for crimping the clips to secure the ducts together and is comprised of a rectangularly shaped base plate including pairs of opposed rollers mounted thereon with their axes perpendicular to the plate. A gap between the rollers is approximately the same size as the width of the combined edges being secured together. A raised pusher member pushes a clip which is resting on the plate into place and the same is crimped by the rollers when the tool is drawn back. A handle is located on the reverse side of the plate for manually moving the tool.

BRIEF DESCRIPTION OF THE DRAWINGS

For the purpose of illustrating the invention, there is shown in the accompanying drawing one form which is presently preferred; it being understood that the invention is not intended to be limited to the precise arrangements and instrumentalities shown.

FIG. **1** is a front perspective view of a hand tool constructed in accordance with the principles of the present invention;

FIG. **2** is a rear perspective view of the tool;

FIG. **3** is a view similar to FIG. **1** but showing a clip in position on the tool in preparation for installing the same;

FIG. **4** is an illustration of the manner in which the tool is used to apply the clip to duct work flanges;

FIG. **5** is a cross-sectional view showing a clip applied to the flanges, and

FIG. **6** is a cross-sectional view showing the manner in which the tool is utilized to crimp the clip to the flanges.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings in detail wherein like reference numerals have been used throughout the various figures to designate like elements, there is shown in FIG. **1** a hand tool for installing clips to abutting edges of ducts and for crimping the clips to secure the ducts together constructed in accordance with the principles of the present invention and designated generally as **10**. The clips which are intended to be installed by the tool **10** are shown at **12** in FIGS. **3**, **5** and **6**. And the ducts which are intended to be secured together are shown, by way of example, in FIG. **4** as elements **14** and **16**.

The tool **10** is comprised essentially of a rigid flat planar and elongated base plate **18** which is preferably comprised of steel or other similar material. In the preferred embodiment, the base plate **18** is approximately twelve inches long, four inches wide and has a thickness of approximately one-fourth inch.

Mounted on the back surface **20** of the base plate **18** and adjacent the lower end thereof is a handle means comprised basically of two parts. The first part includes a pipe coupling member **22** which is welded to the surface **20** and which includes a threaded bore. A pipe section **24** having an externally threaded end thereon is adapted to be threaded into the coupling member **22**. The pipe section **24** may, of course, be removed from the coupling member **22** whenever desired.

The handle comprised of the combined members **22** and **24** is normally utilized when the tool **10** is being used to install clips at locations which cannot easily be reached. In other words, the pipe section **24** functions as an extension. For more easily accessible locations, a second handle means **26** is provided. Handle **26** is a substantially U-shaped bracket welded to the back surface **20** and which can be easily grasped by a person's hand when the pipe section **24** is removed. The handle **26** is, of course, U-shaped so as to allow the pipe section **24** to be connected to the pipe coupler **22** whenever desired. This is by way of example only as the handle **26** may take other forms such as a solid block with an aperture therethrough for allowing the pipe section **24** to pass.

Welded to the front surface **28** of the base plate **18** is a pusher means in the form of a raised rectangularly shaped block **30**. Block **30** is preferably also comprised of steel or similar material and has a front or leading edge **32** which is substantially perpendicular to the surface **28**. The thickness of the block **30** is approximately one-fourth inch.

Also mounted on the front surface **28** of the base plate **18** and adjacent the upper end thereof are a plurality of rollers **34**, **36**, **38** and **40**. The rollers are secured to the base plate **18** through the use of a plurality of bolts **42** and nuts **44** or by any other similar known means. Each of the rollers is substantially cylindrically shaped and is comprised of steel or some other similar hard material. Each wheel is mounted on the plate **18** so that the roller is rotatable about an axis perpendicular to the base plate. Preferably, the rollers **34–40** include ball bearing type mountings.

The rollers are mounted in pairs with each roller of each pair lying on either side of the centerline of the base plate **18**. In other words, rollers **34** and **36** comprise the first pair with the roller **34** mounted on the left side of the plate **18** as viewed in FIGS. **1** and **3** and roller **36** being mounted on the right side thereof. Similarly, roller **38** is mounted below roller **34** on the left side and roller **40** is opposite roller **38** on the right side. It should be noted that the two pairs of opposed rollers are shown as the preferred embodiment only. It is not beyond the scope of the present invention to utilize only one pair of opposed rollers or to use three or more pairs. Two pairs are, however, the preferred embodiment. It is required, however, that sufficient space be left between the lower pair of rollers, i.e. rollers **38** and **40** in the preferred embodiment and the edge **32** of the pusher **30** so as to allow a clip **12** to fit therein as shown in FIG. **3**. The purpose for this will become more apparent hereinafter.

As shown most clearly in FIG. **6**, each pair of rollers such as rollers **34** and **36** are mounted so as to leave a gap of approximately one-half inch between the outer peripheries of the rollers. This gap is substantially equal to the thickness of the flange portions **46** and **48** which are being joined together. This gap is, of course, in alignment with the gap between the rollers **38** and **40**, overlies the centerline of the base plate **18** and is in alignment with the pusher block **30**.

As can also be clearly seen from FIG. **6**, each of the rollers is mounted so as to be spaced a slight distance from the front surface **28** of the base plate **18**. In the preferred embodiment, this distance is approximately one-fourth of an inch. The inner edges of the periphery of each of the rollers is also chamfered such as shown at **50**.

The tool **10** is used in the following manner. First, the leading ends of flanges such as flanges **46** and **48** of ducts **14** and **16** which are to be joined are forced together. This is normally relatively easily done by merely pushing on the ducts. The tool **10** is then inverted as shown in FIG. **4** and is pushed toward and onto the flanges **46** and **48** so that the combined flange moves into the gap between the pairs of opposed rollers. As the tool is moved, the rollers roll onto the flanges forcing them together. When the rollers **38** and **40** have reached the flanges, a clip **12** is placed into the position shown in FIG. **3** with its top surface against the front surface **28**. As can also be seen from FIG. **3**, the lower end of the clip **12** abuts against the edge **32** of the pusher means **30**.

The clip **12** is initially manually held in place on the tool **10**. As the tool is continually moved forwardly, i.e. to the left in FIG. **4**, the leading end of the clip **12** pushes over the combined flanges **46** and **48**. At this point, the operator no longer needs to hold the clip. Further movement of the tool in the forward direction pulls the flanges **46** and **48** together as the same are forced between the rollers and simultaneously slides the clip **12** into the desired position. It should be noted and as can be seen from FIGS. **3** and **5**, the clip **12** includes one short side wall **52** which is normally bent or crimped inwardly and a longer side wall **54** which is not bent or crimped quite as much but is more perpendicular to the upper wall of the clip. In this condition, the clip can be forced relatively easily into place utilizing the tool **10**.

After the clip is in its desired position, the tool **10** is drawn rearwardly, i.e. to the right as shown in FIG. **4**. As this happens, the rollers are forced back over the side walls **52** and **54** of the clip and over the flanges **46** and **48** as shown in FIG. **6**. As this occurs, the clip is crimped. More particularly, the opposed rollers bend the side wall **54** of the clip **12** so as to conform to the periphery of the rollers. The clip **12** is now firmly in place and securely holding the flanges **46** and **48** and thereby the ducts **14** and **16** together.

The overall depth of the tool **10** from the upper surface of the handle **26** to the upper surfaces of the rollers is preferably less than three inches. Thus, even when the duct work is located against a wall or near a ceiling with only a few inches of space remaining, the present too can be used to both apply and crimp the flange joining clips thereto.

The present invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof and accordingly, reference should be made to the appended claims rather than to the foregoing specification as indicating the scope of the invention.

I claim:

1. A hand tool for installing clips to abutting edges of ducts and for crimping the clips to secure the ducts together comprising:

a rigid flat planar and elongated base plate having a front surface and a back surface;

handle means mounted on said back surface adjacent one end of said base plate;

a raised pusher means mounted on the front surface adjacent said one end of said base plate;

a pair of opposed rollers rotatably mounted on the front surface adjacent the other end of said base plate, said rollers being rotatable about axes perpendicular to said base plate and being spaced from each other on either side of a substantial centerline of said front surface so as to leave a gap between the other peripheries of said rollers which gap overlies said centerline and in alignment with said pusher means.

2. The tool as claimed in claim **1** wherein said rollers are located a slight distance above said front surface.

3. The tool as claimed in claim **2** wherein said distance is approximately one-fourth of an inch.

4. The tool as claimed in claim **3** wherein said pusher means has a height of approximately one-fourth of an inch.

5. The tool as claimed in claim **1** wherein said gap is approximately one-half of an inch.

6. The tool as claimed in claim **1** wherein each of said rollers is substantially cylindrically shaped and includes a chamfer on the outer surface adjacent the lower end thereof.

7. The tool as claimed in claim **1** further including a second pair of opposed rollers, said second pair being substantially the same as said first mentioned pair and being similarly mounted on said front surface.

8. The tool as claimed in claim **1** wherein said handle means includes a coupling member mounted on said back surface and an elongated rod adapted to be releasably connected to said coupling member.

9. The tool as claimed in claim **1** wherein said handle means includes a member extending from said back surface so as to be grasped by a person's hand and including an opening therethrough in substantial alignment with said centerline.

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